

An economic approach to alien species management

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Outline

- ◆ What are the costs of alien species?
- ◆ Which management strategy is best?
- ◆ Which policy to choose?
- ◆ Conclusions

1. What are the damage costs of alien species?

- ◆ *Definition of damage costs:*
changes in total net welfare in a society caused by an alien specie

Estimates of damage costs per year

	USA	Australia	South Africa	India	Brazil	UK	Germany
Total, bill USD	120	7.5	3.8	116	47	9.7	0.3
USD/cap	410	64	91	115	277	20	2.5
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Allocation of costs in % per country

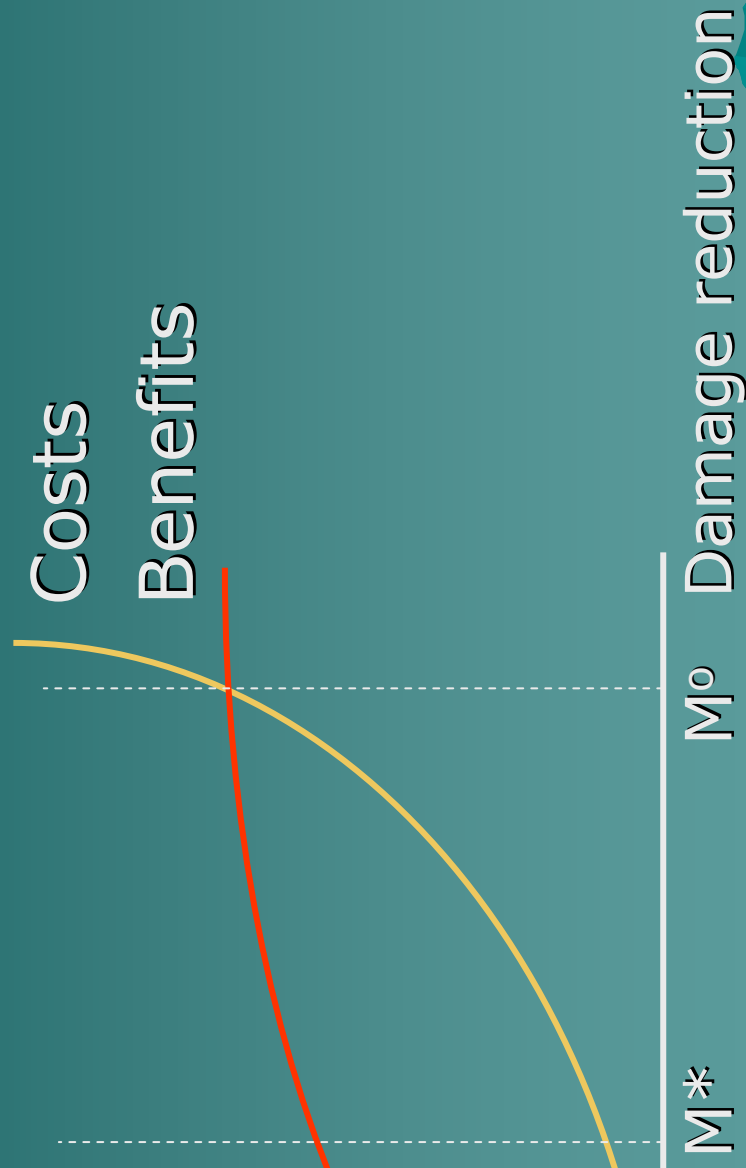
Damage type	USA	Australia	S. Africa	India	Brazil	UK	Germany
Agric.	62	58	92	100	94	83	15
Forest	4						16
Aquatic	6		3				29
Health	5	1	5		6	7	28
Biodiv.	15	41				10	
Others	8						12
Total	100	100	100	100	100	100	100

2. Which is the best management strategy?

- ◆ Balancing costs and benefits from reducing damage from alien species
 - benefits, avoided damages from alien species
 - costs of damage reduction is determined by i) cost of the measure and ii) its impact on damage

Best strategy: maximising net benefits

USD



Types of mitigation measures

- ◆ Prevention
 - port inspections
 - quarantine
 - ballast cleaning
- ◆ Control
 - barriers
 - harvesting
 - biological control
- ◆ Eradication
 - chemical treatment
 - harvesting

Data requirements

- ◆ Costs:
 - cost of each of all possible measures (prevention, control, eradication) -> direct and indirect damage reduction
- ◆ Benefits:
 - direct and indirect damage reduction -> monetary estimates (e.g. profits from harvest increase, recreational values)

Benefit cost ratios for some studies of single species

Country	Specie	Benefit type	Measure	Benefit/cost
Australia	Blackberry, Echimium species	Agriculture	Biological control	20
Australia	Weed	Agriculture	Biological control	1.5
Australia	Echimium species	Agriculture	Biological control	8.7
South Africa	Aquatic weed	Agriculture, recreation, municipal	Biological control	2.5
Sweden	Aquatic weed	Swimming, canoeing, fishins	Mechanical	1.4

3. Which policy should be used?: Criteria for policy design

- ◆ Cost effectiveness and technological development
- ◆ Precision and flexibility
- ◆ Equity and fairness

Policy instruments

- ◆ Command and control (precision)
- ◆ Economic instruments (cost effective, fair, flexibility, stimulates technological development)
- ◆ Market for trading in rights or obligations (precision, cost effective, flexibility, technological development)
- ◆ Voluntary agreement (cost effective, insufficient)

Instruments and functioning in practice: example of signal cray fish in Sweden

- ◆ Command and control since 1960'
- ◆ Large variation in signal cray fish water in relation to total waters among municipalities
- ◆ Frequency of signal cray fish increase for
 - higher income
 - EU entrance 1995
 - ideological preferences for (conservatism)

Results from (very few) policy studies on alien species

- ◆ Theoretical:
 - risk and uncertainty favour precautionary principle and systems of command and control and markets for trading
 - import tariffs may result in increased alien species due to changes in commodity composition and transportation
- ◆ Empirical:
 - A system with trading risk for aliens among vessels in Great lakes reductions is half the cost of a command and control system with equal requirements
 - Implementation of control in practice can differ much between regions within a country

4. Conclusions, results

- ◆ Damage costs of alien species:
 - Costs of invasive species highest for agriculture
 - Very few European estimates of costs of aliens
- ◆ Management strategies:
 - benefit cost analyses made mainly for biological control, which show benefit cost ratios exceeding 1
 - no cost effectiveness studies where costs for prevention, control, and eradication measures are estimated and compared
- ◆ Policy choice:
 - almost non-existing policy studies
 - theoretical results favour quantitative regulations
 - behavioural responses to actual regulations can differ among regions in country

Conclusions, challenges

- ◆ Quantifying direct and indirect impacts to specific species
- ◆ Quantifying impacts of measures on spread of species
- ◆ Identifying management strategies under uncertainty

Thank you

- ◆ Audience
- ◆ Organizers
- ◆ Maj and Tor Nessling foundation